better for the station to make arrangements to work in orchards already established. Special investigations of different kinds must be carried on away from the station in order to be of any use. By going into different localities, as the needs of its work demand, the station can make itself more useful to the State as a whole. Without doubt co-operative experiments need to be very carefully planned and thoroughly supervised to be successfully conducted, and their success depends on their quality rather than their number. It is encouraging to observe that more careful attention is being given to this important matter by station officers, and it is believed that this work may be made much more economical and useful than the permanent substations as ordinarily managed.

CO OPERATION OF THE STATIONS WITH THE DEPARTMENT OF AGRICULTURE.

As the stations and the various branches of this Department are working along similar lines, it has been found increasingly desirable for the Department and the stations to unite in co-operative enterprises, and this has been done to an increasing extent. This policy has been approved by the action of Congress, which in recent years has in an increasing number of instances authorized or directed co-operation with the stations in the appropriation acts making provision for the maintenance of this Department. These co-operative enterprises have so far increased in extent and variety as to make it desirable to have a more formal plan for arranging for such co-operation than has hitherto been necessary. In recognition of this need the Secretary of Agriculture made an order under date of February 28, 1899, requiring the officers of this Department to submit their plans for co-operation with the stations for his approval before negotiating with the stations, and designating the Office of Experiment Stations as the representative of the Department in arranging for such co-operation and keeping a record of the co-operative enterprises agreed upon. Under this order the Department and the station each designate the officers who are to have immediate charge of the co-operative work in any given case, and these officers carry out the details of the plan agreed upon. Recognizing the importance of this matter, the Association of American Agricultural Colleges and Experiment Stations, at its recent meeting in California, appointed a committee to confer with the Secretary of Agriculture on this subject and make a report to the Association at its next session.

The governing boards and executive officers of the stations feel the necessity of having the terms of co-operative operations definitely stated and the whole transaction made a matter of record as a component part of the station business. It is also desirable that ample opportunity should be given for the station to consider how far and in what ways co-operation with the department is desirable, and to what extent its funds will be involved in such co-operation. The stations are to an increasing extent becoming centers of information and authority on lines of work in which they have been engaged with special reference to the local requirements of agriculture, and it is by supplementing the funds already at the disposal of the stations for work in special lines, and by securing the services of their expert officers and the use of the special facilities at their command, that the Department can oftentimes accomplish results more economically and efficiently than by instituting parallel and independent investigations. As the operations of the stations become better organized in their respective localities, they have a just expectation that their knowledge of the local requirements of agriculture and their position as authorities on the subjects in which they work will be more fully

recognized. By the union of these State institutions with this Department in the conduct of the larger enterprises for the promotion of agriculture in the United States, much more can be accomplished than by either agency working separately. The relations between the stations and this Department were never more cordial and intimate than they are now, and a relatively large number of co-operative enterprises have been undertaken during the past year on terms mutually satisfactory to the Department and the stations.

AGRICULTURAL EXPERIMENT STATIONS IN ALASKA.

The work in Alaska during the past year has included a continuation of the agricultural survey of this region and the inauguration of permanent experiment stations in accordance with the changed terms of the appropriation act of the current fiscal year. The results of our investigations and the accumulated evidence from other sources have, it is believed, sufficiently shown the desirability and feasibility of regular experimental inquiries for the promotion of agriculture in Alaska. With the completion and equipment of the offices, laboratories, and farm buildings at Sitka and Kenai, it will be possible to prosecute these inquiries much more efficiently. The establishment of headquarters for similar work in the interior, which, it is hoped, may be done the coming season, will make it possible to obtain more definite information regarding the agricultural capabilities of this region, which differs so materially from the coast region.

AGRICULTURAL EXPERIMENT STATIONS IN HAWAII, PUERTO RICO, AND THE PHILIPPINES.

The experiment station at Honolulu, in the Hawaiian Islands, maintained by the Hawaiian Sugar Planters' Association, has continued to be successfully conducted during the past year. It is hoped that advantage will be taken of the basis for experimental inquiries in agriculture in these islands thus laid by local enterprise, and that the United States Government will speedily supplement the efforts of the people of these islands in this direction as it has done in the States and Territories. Agricultural experiment stations should also be established without delay in Puerto Rico, and a plan should be made for their organization in the Philippines as soon as peace and order are established in those islands. In some respects legislation for the establishment and maintenance of agricultural experiment stations in the islands, under the control of the United States Government, should be wider in its provisions than the Hatch Act. Especially should provision be made for meeting the need of the people of those islands for immediate information regarding improved methods of agriculture which it is possible to give them, on the basis of the results of agricultural investigations already made elsewhere.

Any plan for experiment stations in Hawaii, Puerto Rico, and the Philippines should involve the following features: (1) A local station with land, buildings, and equipment for field and laboratory investigations; (2) an agricultural survey to study the agricultural capabilities and requirements of these islands; (3) co-operative experiments with resident farmers; (4) dissemination, under frank, of bulletins of original and compiled information in the language of the people for whom they are intended; and (5) the holding of farmers' meetings in different localities for the diffusion of practical information.

EXPERIMENT STATION EXHIBIT AT THE PARIS EXPOSITION OF 1900.

An exhibit designed to show the development and present status of the experiment station enterprise in this country has been

prepared for the Paris Exposition of 1900 by a committee of the association of colleges and stations, of which Professor H. P. Armsby, director of the Pennsylvania Experimental Station, is chairman. The exhibit consists of a collection of special devices for station work and illustrations of notable results by means of models and otherwise, photographs and charts showing the buildings and equipment of the stations and special features of their work and their results, and the publications of the stations and of this office. In connection with this exhibit a comprehensive illustrated report on the history and present status of the stations has been prepared in the office of Experimental Stations with a view to showing what has been accomplished by the stations since their establishment, and the scope of this great enterprise on behalf of our agriculture as it exists at the close of the nineteenth century.

THE OFFICE OF EXPERIMENT STATIONS.

The work of the Office of Experiment Stations during the past year, as heretofore, has included the supervision of the expenditures of the stations; conferences and correspondence with station officers regarding the management, equipment, and work of the stations, and the collection and dissemination of information regarding the progress of agricultural investigations throughout the world by means of technical and popular bulletins. The special investigations on the nutrition of man and on irrigation assigned to this office have been prosecuted very largely in co-operation with experiment stations, educational institutions, and other agencies in the different States and Territories.

During the year the office issued 46 documents, aggregating 2924 pages. These include 13 numbers of the Experiment Station Record, with detailed index; 13 bulletins, 8 Farmers' Bulletins (including 5 numbers of the subseries entitled 'Experiment Station Work'), 3 circulars, 1 schedule, 3 articles for the Yearbook of the Department, the Annual Report of the Director, a report to Congress on the work and expenditures of the experiment stations, and 3 special articles published as separates.

The tenth volume of the Experiment Station Record comprises 1220 pages, and contains abstracts of 361 bulletins and 35 annual reports of 53 experiment stations in the United States, 172 publications of the Department of Agriculture, and 1224 rereports of foreign investigations. The total number of pages in these publications is 57,230. The total number of articles abstracted is 2023, classified as follows: Chemistry, 150; botany, 127; fermentation and bacteriology, 27; zoology, 23; meteorology, 46; air, water, and soils, 86; fertilizers, 109; field crops, 236; horticulture, 173; forestry, 34; seeds and weeds, 37; diseases of plants, 180; entomology, 202; food and animal production, 223; dairy, farming and dairying, 168; veterinary science, 86; technology, 6; agricultural engineering, 28; statistics, 82. Classified lists of articles, in some cases with brief abstracts are also given in each number. The aggregate number of titles thus reported is 1820.

STATISTICS OF THE STATIONS.

Agricultural experiment stations are now in operation, under the act of Congress of March 2, 1887, in all the States and Territories. As stated above, agricultural experiments have been begun in Alaska with the aid of national funds, and an experiment station is in operation in Hawaii under private auspices. In each of the States of Alabama, Connecticut, New Jersey, and New York a separate station is maintained wholly or in part by State funds, and in Louisiana three stations are maintained with national and State funds. Excluding

the branch stations established in several States, the total number of stations in the United States is 56. Of these, 52 received the appropriation provided for in the act of Congress above mentioned.

The total income of the stations during 1899 was $1,143,334.93, of which $720,000 was received from the National Government, the remainder, $423,334.93, coming from the following sources: State governments, $240,300.20; individuals and communities, $12,100; fees for analyses of fertilizers, $75,294.42; sales of farm products, $69,312.60; miscellaneous, $26,327.71. In addition to this the Office of Experiment Stations had an appropriation of $40,000 for the past fiscal year, including $10,000 for the Alaskan investigation. The value of additions to equipment of the stations in 1899 is estimated as follows: Buildings, $27,218.64; libraries, $10,796.15; apparatus, $16,917.07; farm implements, $10,784.88; live stock, $16,265.95; miscellaneous, $22,521.93; total, $104,504.62.

The stations employ 678 persons in the work of administration and inquiry. The number of officers engaged in the different lines of work is as follows: Directors, 71; chemists, 148; agriculturists, 68; experts animal husbandry, 9; horticulturists, 77; farm foremen, 21: dairymen, 23; botanists, 52; entomologists, 48; veterinarians, 36; meteorologists, 17; biologists, 7; physicists, 7; geologists, 5; mycologists and bacteriologists, 20; irrigation engineers, 5; in charge of substations, 16; secretaries and treasurers, 24; librarians, 9; and clerks, 43. There are also 48 persons classified under the head of 'miscellaneous,' including superintendents of gardens, grounds, and buildings, apiarists, herdsmen, etc. Three hundred and eight station officers do more or less teaching in the colleges with which the stations are connected.

During 1899 the stations published 445 annual reports and bulletins. Besides regular reports and bulletins, a number of stations issued press bulletins, which were widely reproduced in the agricultural and county papers. The mailing lists of the stations now aggregate 500,000 names. Correspondence with farmers steadily increases and calls upon station officers for public addresses at institutes and other meetings of farmers are more numerous each year. The station officers continue to contribute many articles on special topics to agricultural and scientific journals. A number of books on agricultural subjects, written by station officers, have been published during the past year.

SCIENTIFIC BOOKS.

The Diuturnal Theory of the Earth. Published by Myra Andrews and Ernest G. Stevens. New York. 1899.

This work belongs to a class usually not worth reviewing, but concerning which it is perhaps unwise to be absolutely silent. In this instance the earnest, well-meaning seriousness of the author, the abounding faith of the publishers, growing probably out of close family relationship, together with the absence of absolute impossibility or absurdity in the general doctrine advocated, fully justify a brief notice of the book. It is a well-printed octave volume of about 550 pages, and includes a portrait and a biographical sketch of the author.

Mr. William Andrews, the discoverer of the 'diuturnal motion of the earth,' was born in Philadelphia in 1798, and died at Cumberland, Md., where he had lived for half a century, on August 6, 1887. The preface to his book is dated 1876—and it was issued late in the year 1899. His business was that of a stationer and book binder, but his chief delight was in making geological and natural history collections, accumulating a 'museum' containing many thousand specimens. In this work he appears to have been successful and a portion of his 'museum' was purchased by the State of New York. The preparation of this work occupied much of his time during the later years of his life, but he also left manuscript essays on psychology and

philosophy, the publication of which in the near future is promised.

That he was a great genius does not seem to be doubted by his biographer, Mr. E. S. Stevens, who declares that he was not only a great geologist, but also a great philosopher; that he was "the greatest scientist America has produced," that "he has left little to be accomplished," and that he has "taken his place beside Copernicus, Galileo, Newton and Darwin."

And what is the 'diuturnal motion of the earth' upon the conception and alleged proof of which so much claim to distinction is made to rest? No very clear account of it is to be found anywhere in the book, but it is obviously intended to mean a slow, progressive movement of the pole of the earth's axis of revolution in a spiral line around the earth's surface. Maps are given showing six lines of polar transmission across the Eastern and the Western hemispheres, and the period occupied in passing through one 'curl' of the spiral is assumed to be extremely great. This movement of the position of the earth's axis would necessarily produce great climatic changes, but in addition to this it is alleged that there would be a shifting of the superficial strata or crust of the earth relative to the interior, and upon this hypothesis is founded an explanation of existing geological phenomena, which, in the judgment of the biographer, 'transforms the patchwork of geology into a complete science.'

Among numerous illustrations of the author's fitness for discussing problems involving physical and dynamical laws, in which the book abounds, the following may be quoted: "Heat we claim to be material; it is substance and gravitates towards the center of the earth, constantly keeping an equilibrium between the interior forces and the external atmosphere, with its stratified fields of electricity and magnetism; but when that gravitated heat comes in contact with sedimentary deposits, containing a superabundance of compound substances, as vapors, gases and ethers, and liberates these through the action of the chemical processes in that great laboratory of nature, they must find their outlet through established chimneys, as volcanoes, or otherwise make new openings for their ascent to the upper air; and only in events like this would we be willing to attribute the phenomena called earthquakes to internal forces."

Speaking of Galileo the author says, "He discovered that the vibrations of all pendulums, even of different lengths were performed in equal time. * * * He also ascertained the beating of the pulse from this fact and counted it by the vibrations of a pendulum. * * * He discovered the thermometer, an instrument by which is measured the expansion or condensive heat of the atmosphere."

The author shows considerable familiarity with the literature of science, from which extensive quotations are made, often having little relation to the subject under discussion.

There is left with the reader a feeling of regret that those who have the means to contribute to the advancement of science by the issue of such expensive publications as this should not have sought competent advice from recognized scientific authority before going to the printer and book binder.

T. C. M.

Elements of the Differential Calculus. By JAMES MCMAHON, A.M., Professor of Mathematics in Cornell University, and VIRGIL SNYDER, Ph.D., Instructor in Mathematics in Cornell University. New York, Cincinnati, Chicago. The American Book Company. 1898. Pp. xiv + 337.

We have examined this book with pleasure. It was evidently composed in the light. Pedagogical and scientific qualities are united in a degree seldom attained in elementary textbooks. Sound argument, genuine demonstration, logical concatenation, are seen to be, in general, more consistent, than is commonly supposed, with required simplicity and clearness. The claims of the logician, on the one hand, and of the didactician, on the other, are adjusted with notable good judgment and skill. Illustrative solutions are numerous and the volume contains a plenty of suitable exercises for the reader, but the book is by no means a mere 'quarry of examples.' Even less, if possible, is it intended to be a guide to the mere practician. On the contrary, the treatment aims first of all at being scientific. The modern

spirit prevails, a theory is presented, it is the understanding which is addressed throughout, and the student, if he be fit, will not easily escape the conviction, which not every elementary presentation of the calculus is good enough to produce, that he is dealing with a logically coherent body of doctrine, whose applications, moreover, yield absolutely valid results.

A good book points the way to its own improvement. We may, therefore, venture in course of the following remarks to indicate some respects in which what is well done may, in a second edition, be done perhaps even better.

Being confined to the differential calculus, the work possesses, on that account, some peculiar merits but fails, on the same account, to gain what many in recent years have come to regard as the very considerable advantages of presenting differentiation and integration simultaneously. Knowledge of some algebraic matters treated in the brief introductory chapter might, of course, have been defensibly presupposed; but as a precaution such preliminary review seems justified and would, perhaps, be even more acceptable were it more comprehensive. However, a certain fragmentariness and discontinuity of thought could have been avoided if the discussion of continuity, here begun, had been reserved for the next chapter where the discussion is resumed after an interval of twenty pages. From a statement of the properties which a function must possess if it is to be continuous in a given interval, the reader is left to infer what is meant by continuity 'at' and in the 'vicinity' of a point or a value. If the notion of continuity is very important, it is equally elusive, and as the beginner best learns what the idea is by learning what it is not, the authors' discussion, which is good, would have been enhanced, we believe, by a somewhat minute examination of at least several examples of discontinuity. The just observation, p. 11, that the 'essence' (of the infinitesimal) "lies in its power of decreasing numerically, having zero for its limit, and not in the smallness of any of the constant values it may pass through," seems to impose a restriction on the statement of theorem 2 on the following page and to invalidate the proof there given; for, of course, the sum of a finite number of infinitesimals may be constant, zero, while to speak of the 'largest' of the infinitesimals does not go to the 'essence' of the matter. The necessity of the word finite in the theorem is happily shown by examples, though definition of the term finite has not at this stage been attempted. The definition, later given, of finite number as being one which 'is neither infinite nor zero,' is, like that given by G. Cantor, not only negative (which is but a trifling objection) but also unavailable so long as the notion of the infinite is not formed. The infinite has, it is true, been defined as a variable but not as a constant. As constants, nevertheless, capable, moreover, of being 'given,' some infinites must be regarded, if, as in comparison of variables, the phrase 'infinite limit,' is to be recognized as legitimate, unless indeed one be prepared to reconstruct the idea of limit.

The notion of derivative, being attached by definition to that of continuous function, while it assumes the cardinal theorem that every function having a derivative is continuous, is, besides, not unlikely to prove a little bewildering to the student when a few pages later he is informed, without explanation, that some continuous functions do not possess derivatives. And being directed to "show that a function is not differentiable at a discontinuity," the student has only to reply that the function being discontinuous at a point is not continuous there, which is scarcely the answer expected. However, the imperfections noted relate mainly to minutiæ, they are histological imperfections and do not greatly mar the presentation as a whole, which, designed for the novice, is primarily concerned with the more obvious anatomy of the subject.

The chapter on fundamental principles is perhaps the best in the book, though some others, as those on expansion of functions and indeterminate forms, are specially worthy of praise. While no list of 'higher plane curves' has been inserted, there is a chapter on curve tracing and still another, unusually long but luminous, devoted to asymptotes. In dealing with the vexed and vexing question of the differential and the differential notation, the convenient though logically extraneous notion of 'rates,' is employed as sole medium of explanation. It

would be interesting to have the term envelope, here presented in the usual way, so defined as to exclude all curves, such as the node locus, which are not properly tangent to curves of the family.

C. J. KEYSER.

COLUMBIA UNIVERSITY.

G. V. de Lapouge: l'Aryen: Son rôle social. Paris. 1899. 8vo. Pp. xx + 569.

The thesis of this work is that the tall, blond dolichocephalic race of the north of Europe has constituted the progressive and socially dominant element among the so-called Aryan peoples from prehistoric times to the present. In connection with the author's earlier work *les Selections sociales* (Paris, 1896), it is the best presentation of the results of the new school of anthropologists of which Lapouge and Otto Ammon are the leaders. If the results derived from the data now available are confirmed by wider investigation, they will obviously be of great significance for students of psychology, history and sociology, as well as anthropology. Further investigations ought now to be carried forward by individuals or institutions that have the means to prosecute them on an adequate scale.

CABLOS C. CLOSSON.

BOOKS RECEIVED.

Mesures électriques. E. VIGNERON et P. LETHEULE. Paris, Gauthier-Villars. 1900. Pp. 179. 2 fr., 50c.

Produits aromatiques. G. F. JAUBERT. Paris, Gauthier-Villars. 1900. Pp. 169.

La constitution du monde. CLÉMENCE ROYER. Paris, Schleicher Frères. 1900. Pp. xxii + 796.

Logic. ST. GEORGE STOCK. Oxford, B. H. Blackwell. 1900. Pp. xi + 440.

A First Book in Organic Evolution. D. KERFOOT SHUTE. Chicago Open Court Publishing Co. 1899. Pp. xvi + 285.

The Amateurs' Practical Garden Book. C. E. MUNN and L. H. BAILEY. New York and London, The Macmillan Company. 1900. Pp. vi + 250. $1.00.

Physiology. BUEL B. COLTON. Boston, D. C. Heath & Co. 1900. Pp. xiii + 386. 90 cts.

Syllabus of Elementary Physiology. ULYSSES O. COX. Mankato, Minn., Free Press Printing Co. 1899. Pp. viii + 167.

SCIENTIFIC JOURNALS AND ARTICLES.

The Journal of Geology, Jan.–Feb., 1900. Vol. 8, No. 1. 'Suggestions Regarding the Classification of the Igneous Rocks,' by William H. Hobbs. The article sets forth the present condition of the nomenclature and classification and offers many valuable suggestions, which if followed will certainly assist in extricating the science of petrology from the burden of names and complication of systems under which its students are now laboring. The importance of chemical composition in determining the classification of rocks and the use of diagrams to show the relations is emphasized.

'Dentition of some Devonian Fishes,' by C. R. Eastman. The dental characters of some species of the genera *Dinichthys*, *Clododus* and *Dipterus*, with comparative notes and illustrations of some types are discussed.

'Ancient Alpine Glaciers of the Sierra Costa Mountains in California,' by Oscar H. Hershey. The author describes in detail the characters of several of the ancient glaciers of this mountain range, and concludes from their study that they were probably of late Wisconsin age, and that they existed under the same climatic conditions as at present, but at an elevation of about 3000 feet higher than now.

'An Attempt to Test the Nebular Hypothesis by the Relation of Masses and Momenta,' by T. C. Chamberlin. In a comparison of the moment of momentum of the nebular system with moment of momentum of the present system, on the basis of purely mechanical laws, susceptible of mathematical computation, making every concession in favor of the Laplacian hypothesis, the nebular moment of momentum is 213 times larger than the present moment of momentum of the system, where the dynamic law would require them to be equal. Besides this very great discrepancy which is hard to explain on the Laplacian hypothesis, there are individual discrepancies among the planets of even greater significance. These range from 141 to 1 for the Jovian nebula to 1208 to 1 for the terrestrial nebula, with very great irregularity in the distribution from Mercury to Neptune. In the relation of the ratios of planetary masses to their momenta, it appears that Jupiter carried away one tenth of one per cent. of the nebular

mass from which he separated, and 95% of the total momentum of the nebula. These same discrepancies occur also in the other planets with no apparent regularity. The present discrepancies can not be due to transfer of energy through tidal action. The computations show an irregular distribution of mass and momenta throughout the system which could not be derived by known laws under the nebular hypothesis, and so necessitates the construction of a new hypothesis which will give this unsymmetrical distribution. Some of the lines along which this new hypothesis may be sought are suggested. W. G. T.

American Chemical Journal, March, 1900. 'Anethol and its Isomers,' by W. R. Orndorff and D. A. Morton. 'The supposed Isomeric Potassium Sodium Sulphites,' by G. S. Fraps. It was found impossible to obtain the two sodium potassium salts of sulphurous acids which are theoretically possible, if the acid has the asymmetrical structure. 'Condensation Compounds of Amines and Camphoroxalic Acid,' by J. B. Tingle and A. Tingle. 'A Method for the Determination of the Melting-Point,' by M. Kuhara and M. Chikashige. The authors place the substance between a pair of thin cover-glasses. These are held in a holder of platinum and inserted into a test-tube, which serves as an air-bath. 'The Symmetrical Chloride of Paranitro-orthosulphobenzoic Acid,' by F. S. Hollis. 'Stereoisomers and Racemic Compounds,' by H. C. Cooper.

The March issue of *Terrestrial Magnetism and Atmospheric Electricity* contains the following articles:

The physical decomposition of the permanent magnetic field of the United States. No. 1. The assumed normal magnetization and the characteristics of the primary residual field, by L. A. Bauer and D. L. Hazard.

Die Aufgaben der erdmagnetischen Forschung der Vereinigten Staaten Nordamerikas, by L. A. Bauer.

Biographical sketch and portrait of the late Alexis de Tillo.

Einige Gesichtspunkte für die Einrichtung Erdmagnetischer Simultan-beobachtungen zur Erforschung der Ursachen der Erdmagnetischen Störungen, by Ad. Schmidt.

A comparison of the isogonic charts for the year 1900, issued by the 'Deutsche Seewarte' the United States Hydrographic Office, and the United States Coast and Geodetic Survey, by J. A. Fleming.

The United States Coast and Geodetic Survey: Its origin, development, and present status, by E. D. Preston. [Illustrated.]

Notes regarding magnetic instruments:

A source of error in the Kew magnetometer, by H. Morize.

The Coast and Geodetic Survey magnetometer, by L. A. Bauer.

The effect of glass covers in magnetic instruments, by E. G. Fischer.

The number concludes with 16 pp. of abstracts reviews, and notes on terrestrial magnetism and atmospheric electricity.

The *Journal of the Boston Society of the Medical Sciences* for February 20th, opens with an article by H. G. Beyer, on the 'Relation between Mental Work and Physique,' in which the author arrives at the same conclusions as those reached by Dr. W. T. Porter, that precocious children weigh more and dull children less than the average of their age. C. S. Minot briefly describes 'A hitherto Unrecognized Form of Blood Circulation without Capillaries in the Organs of Vertebrates.' D. A. Sargent discusses 'The Relation of the Cephalic Index to Height, Weight, Strength and Mental Ability,' finding among eleven hundred Harvard students the brachycephalic were superior in scholarship and the dolichocephalic in athletics. W. H. Smith describes and figures 'Branching Tubercle Bacilli in Sputum,' and Harold C. Ernst gives a summary of a fully illustrated paper on 'The Development of the Microscope.'

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES.

SECTION OF ASTRONOMY, PHYSICS AND CHEMISTRY.

A MEETING of the Section was held on Monday evening, March 5th. Professor R. S. Woodward gave an account of the Jubilee of Sir George G. Stokes, which he attended as a delegate from Columbia University. The Jubilee was held on the 1st and 2d of June, 1899, on the fiftieth anniversary of the professorship of Sir George G. Stokes at Cambridge. Stokes'

most important work was done between 1842 and 1855. Among other things, he showed that in fluid motion the conditions under which the equations of motion were integrable were the conditions that the motion should be irrotational. He made researches in the elastic solid theory of light. He made advances in the theory of physical geodesy. He showed that the shape of the earth's surface should determine the law by which gravity varied from place to place. He cleared up a good many obscurities in the work of Fourier in regard to Fourier series.

The Jubilee began with the Rede lecture delivered by Professor Cornu, of the École Polytechnique, on the 'Wave Theory of Light,' and its influence on modern physics. Besides dinners, garden parties, etc., the most important ceremonies were the presentation of addresses by the delegates representing about seventy institutions, and the conferring of the honorary degree of Doctor of Science upon Messrs. Cornu, Darboux, Michelson, Mittag-Leffler, Quincke and Voigt. At the dinner which ended the celebration, Sir George Stokes made a speech in the course of which he said that he wished he had done more scientific work, but that if he had, he might not have been there to celebrate his Jubilee.

Mr. A. C. Longden read a paper on the resistance of thin films deposited by kathode radiation. He described his method of depositing thin films on glass and showed some specimens. These films can be used as high resistances instead of the very expensive wire resistances ordinarily used. Films of gold or platinum can be deposited, which have not the lack of durability of alloys. At the same time, unlike the metals in the form of wire, they have very low positive or even negative temperature coefficients. The films are deposited from a kathode of the same material by the discharge of electricity through a vacuum, and can be deposited in any thickness desired, and of any metal, gold and platinum being however the most convenient. The speaker showed a gold film of varying thickness in different parts, the thickest part showing the green color like gold leaf when viewed by transmitted light, and the color varying through blue to violet as the film became thinner.

At the suggestion of Mr. C. C. Trowbridge, Mr. Longden attempted to deposit a thin conducting film of selenium, but he was unsuccessful, as the film deposited was non-conducting. He obtained, however, a film of varying thickness which exhibited the phenomenon of Newton's rings in a beautiful manner.

An election of officers of the Section was held. Professor William Hallock was elected Chairman, and Dr. William S. Day, Secretary, for the ensuing year.

WILLIAM S. DAY,
Secretary of Section.

THE TORREY BOTANICAL CLUB.

AT the meeting on February 18th, a paper was presented by Dr. H. H. Rusby, entitled 'The Tendency of Entomophilous Flowers to Antero-posterior Irregularity.' Its object was to show the distribution among plant-families of cases of such irregularity. Irregularities originating without reference to insect-pollination were classified and excluded. The irregularities considered and connected with insect-pollination, are not found among the 21 lowest of the 43 families of monocotyledons. Of the 10 next higher, 5 show none, 4 show slight or doubtful forms, while the highest, Liliaceæ, with 197 genera, twice as many as the other 9 families combined, shows, amidst general regularity, a few highly irregular genera, two of them simulating Orchidaceous forms. Of the 12 highest families, only 3 are regular. Five of the highest 6 are very irregular, indeed, the highest, Orchidaceæ, phenomenally so. It thus appears that an increased tendency to irregularity is indicative of higher development, but it is liable to occur in families and groups of families usually distinguished for its absence.

This principle was then shown to be even more clearly illustrated by the dicotyledons. In the 53 lowest families, but 4 show irregularity. Only one of these is found among the first 39, and this is Aristolochiaceæ, with a single irregular genus. Among the next 120 families, 27 show irregularity, and these are rather uniformly distributed among the others. Then come 19, several showing slight irregularity and one very irregular, indeed. The next 17 are, with one exception, highly irregular, one of them,

however, being so in only a few of its genera. The 11 highest families are very peculiar. While mostly regular, some of them are noted for irregularity, but this is so peculiarly adjusted in the inflorescence as to bring about the condition of regularity so far as the latter is concerned. Thus the daisy, while an inflorescence, is essentially a regular flower, by virtue of the arrangement of its irregular florets. It is also noticeable that as these ray flowers are usually pistillate, this arrangement reverses the position, so far as the head is concerned, of the distinctively pistillate portion. The various types of irregularity in composite flowers were discussed, and these were contrasted with other families exhibiting radiant inflorescences.

It was pointed out that irregularity was not a fundamental characteristic, but was readily called into existence by the exigencies of any group, or even species, and might be expected to develop anywhere. Special attention was called, as illustrating this principle, to the marked irregularity of *Cotyledon gibbiflorum* and *Saxifraga sarmentosa*, species in notably regular genera. It was also noted as significant that the most irregular families, such as Leguminosæ, might have extensive series of genera perfectly regular; also that almost exactly equal forms of irregularity might develop in families most widely separated, as the Liliaceæ and the Capparidaceæ. The fact that irregularity is more frequent in the higher families of the two classes is due to the fact that an essential property of such families is a greater power of adaptation, floral irregularity being only one manifestation of this character.

Edward S. Burgess,
Secretary.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

At the meeting of the Academy of Science of St. Louis of March 19, 1900, fifty-eight persons present, Dr. H. von Schrenk exhibited some burls on the white spruce (*Picea Canadensis*). The burls, unlike most of those so far known, are almost round, and are covered with smooth bark. They grow of various sizes, and occur on the trunk and branches of a group of spruces limited to a small area. The wood fibres are arranged in annual rings; they differ from normal wood fibres because of their thinner walls and greater internal diameter, giving the wood a spongy character. Long rows of secondary resin passages occur in each ring. The largest burls, which are from one to three feet in diameter, have rows of long holes within each ring. These holes are diamond-shaped in cross-section, the longer diameter extending radially. Between the holes the wood fibres are compressed tangentially. The speaker explained that the holes must have resulted from an excessive radial pressure exerted from without, probably by the bark. No holes were found where the bark pressure had been released, *i. e.*, where the bark had burst. These results are not in harmony with the findings as to bark pressure reached by Krabbe. The speaker described the manner in which burls are usually formed, and showed the way in which these burls form, by excessive growth, induced by a wound or branch stump.

Professor F. E. Nipher exhibited stereopticon slides made from a large number of photographic negatives which had been taken by the electric spark from a Holtz machine. The negatives show a complete picture of the object acted upon by the spark, and also show the electrical radiations in the field around the object photographed. The plates were greatly over-exposed to light before they were used. They were allowed to lie fully exposed in a well lighted room, for from one to nine days. One of the best negatives was developed from a plate thus exposed for nine days. The best results are obtained by darkening the room when the electrical image is produced. Light is found to counteract the electrical effects when their action is simultaneous and also when it follows the electrical exposure.

The pictures are developed in the dark room, by the light of an incandescent lamp. When the negative begins to fog, it is taken nearer to the lamp, and it at once clears up. All of these methods are in total disregard of all ordinary photographic procedure. The plates used are extra rapid, and the developing solution is that in common use in photography.

The result which is most interesting from a scientific point of view is shown on twelve negatives which reveal ball lightning effects. Ball

lightning is to the electrician what the sea serpent is to the zoologist. It has often been seen, but never by those who are most competent to study and describe it, and all efforts to produce ball lightning effects by artificial means have hitherto failed. But these twelve negatives show with perfect distinctness discharges of this character. They could be seen while they were being photographed. They looked like little spheres of light, which traveled over a non-conducting plate, forming the insulation of a condenser. They traveled very slowly among the sparks of the ordinary disruptive discharge. Their speed was usually at the rate of an inch in three or four minutes. Their tracks showed with the greatest sharpness among the more indistinct flashes of miniature lightning. They sometimes jump for a quarter to a third of an inch, with such quickness that the eye can hardly follow them. Five or six such spheres of light sometimes appear at once, each following its own track. Sometimes one will cross a track previously traced by another, but it never follows the track of another.

By proper illumination of the room the effects of the spark discharges can be nearly obliterated in the negative, but the paths of the ball discharges are not materially affected. One negative thus treated had been exposed for thirty-five minutes, and the ball lightning tracks were most elaborate. The branching network of lines must have been produced by hundreds of these little spheres.

The same results can be obtained by fixing the negatives without any developing process. Everything then vanishes from the plate but the ball discharges.

Professor Nipher stated that this phenomenon could not be identified as the same thing as ball lightning, since the latter had not been studied. But it responds to the same description in many ways. As soon as the ball lightning effects appear, the behavior of the machine changes in a very remarkable way.

Mr. Koch exhibited an electrical fire annunciator.

Five persons were elected to active membership in the Academy.

WILLIAM TRELEASE,
Recording Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

AT the 515th meeting of the Philosophical Society of Washington, held at the Cosmos Club, March 17th, Mr. Abbe called the attention of the members to three interesting works in meteorology:

1. The work in theoretical physics, viz, the memoir of Professor Marcel Brillouin, explaining the formation of cloud and rain in accordance with the principles developed by Helmholtz and von Bezold. The full memoir is published by the Central Meteorological Bureau of France.

2. A work in experimental laboratory physics conducted by Mr. C. T. R. Wilson, showing how the condensation of aqueous vapor takes place by preference upon the negative ions and that such negative nuclei can be formed in the atmosphere by the action of various forms of radiation including the Röntgen Rays, the Uranium rays, sunlight, etc. That, finally, according to Professor J. J. Thomson, we must no longer regard the earth as primarily electrified negatively, and acting by induction upon the atmosphere to make it positive. We must regard the atmosphere as a mixture of neutral atoms and positive and negative ions; the latter being brought down to the earth's surface by rain make the earth negative while leaving the atmosphere positive.

3. A work of observation in the free air, viz: the Report of Professor H. Hergesell of Strasburg, published in the last number of the *Zeitschrift* of the German and Austrian Societies. In this report Hergesell presents isotherms, isobars and movements for sea level and at 5000 meters and, also, 10,000 meters elevation for three different dates, as deduced from 32 balloon ascensions, thus demonstrating the existence of the descending cyclones with cold centers first described by Ferrel. The three memoirs above mentioned were submitted for the personal examination of the members present.

Mr. L. P. Shidy read a paper on the State of Progress of our knowledge of the Tides, in which after briefly reviewing the steps by which our knowledge has been increased, he presented some of the views of Dr. R. A. Harris in regard to the tidal movements in the great oceanic

basins. This mode of explanation of the tides, which has not yet been published, asserts that "In most cases the dominant ocean tides have their origin in definite systems whose free periods of oscillation are very nearly those of the tidal forces; and that the time of high or low water in each is the time when the virtual work of the tidal forces upon the system becomes zero." The time and height of the tides in Lake Superior and the eastern portion of the Mediterranean Sea, as computed by the corrected equilibrium theory, were found to agree with observations quite well. A number of localities forming fractional areas having dependent stationary waves were enumerated, the tides in the Gulf of Suez and in the Gulf of Maine being selected as examples which were somewhat fully explained.

Mr. L. A. Bauer then exhibited a number of lantern slides showing photographs of distinguished men in the line of Meteorology and Magnetism. A number of views of noted magnetic observatories were also given. On account of the lateness of the hour Mr. Bauer was obliged to omit a descriptive paper which he had prepared on the subject.

E. D. Preston,
Secretary.

DISCUSSION AND CORRESPONDENCE.

ELECTRICAL UNITS AND THE INTERNATIONAL CONGRESS.

In Mr. Wolff's interesting article on the 'Electrical Standards of the Office of Weights and Measures (Science, March 16, 1900), there is an unjustifiable criticism (unintentionally so, I have no doubt) of the work of the International Congress of 1893, in defining the three fundamental units.

A careful reading of the official report of the Chamber of Delegates will show that a special effort was made to avoid the error which Mr. Wolff thinks the Congress committed. As the official Proceedings include little of the discussion which occurred during sessions lasting nearly a week, a brief reference to the history of these definitions may be useful. A large part of one of the early sessions was spent in discussion, which almost became controversy, of the definitions of the ohm, ampere and volt. A set of definitions was submitted by the American delegates which were *primarily* rigorous, essentially those of the British Association Committee, the material representations being defined as approximations. The idea was to adopt definitions which in themselves would never need revision, leaving the way open, however, to any better approximations in material standards that might be possible in the future. These definitions were advocated by the American and English delegates, but they were opposed by the German and French members of the Chamber. At the end of the day it looked as if the Chamber might not be able to come to an agreement upon even the fundamental units, and to avoid so unfortunate an issue a Committee consisting of Messrs. Von Helmholtz, Mascart, Ayrton and Mendenhall, with the President of the Chamber, Professor Rowland, was appointed to bring in a report defining the ohm, ampere and volt at the next session.

This committee reported on Thursday, August 24th, and its conclusions, which were unanimously adopted by the Chamber, became the basis of all subsequent work.

It will thus appear that the definitions of the fundamental units as issued by the International Congress were not exactly what the American and English delegates would have chosen, but some sort of a compromise was necessary in order to avoid a failure. Care was taken, however, to see that there was really no inconsistency or absurdity present or possible in the language used. The ampere is said to be '*represented sufficiently well for practical use by, etc.*,' and in the definition of the volt the same phrase occurs so that the ampere is *not* declared to be a current of a certain silver depositing power, nor is the volt declared to be a certain fraction of the E. M. F., of a Clark cell. A variation of the same language is used in defining ohm but it was found impossible to get exactly the same words in. When, in 1894, Congress enacted a law legalizing these units, a few slight verbal changes were made without altering the meaning.

T. C. M.

NECTURUS MACULOSUS RAFINESQUE IN THE LOWER DELAWARE RIVER.

IN the *American Naturalist* for 1892, pp. 779 and 780, Mr. W. B. Marshall gives an account of 'Necturus maculatus in the Hudson River' in which he calls attention to the fact that no record is known to him of its inhabiting the Delaware River, though he presumes that it may probably be found there at some future time. I am very glad to justify his statements with the fact that I have received a mature living specimen for examination that was taken in Darby Creek, which is a tributary of the Delaware River and into which it empties several miles below Philadelphia. The precise locality was near Essington and the date of capture March 2d. When captured, being taken in a small cast net, it was said to have emitted a cry very much resembling that made occasionally by frogs when taken in the hand. The animal has now lived a week in captivity and has been feeding almost entirely on small fish and tadpoles. It seems particularly fond of the common Mud Minnow (*Umbra pygmæa*) and various small Sunfishes (Centrarchidæ), of which it has consumed about fifty or more. By the occurrence of this species in the lower Delaware, where, it would seem, it found its way from the Hudson River by means of the Delaware and Hudson canal, which connects the two rivers at Port Jervis and Kingston, it has enlarged its geographical distribution through the unintentional aid of man. Most likely the occurrence of other aquatic animals, indigenous to the western part of New York, that have or might be found in the Delaware basin, have reached the latter through the same means, as the Erie canal connects the Hudson with many of the streams of western New York.

HENRY W. FOWLER.

LAMPREYS IN CAPTIVITY.

VERY small (6 mm.–8mm.) Ammocœtes larvæ are quite delicate, and it was only by the exercise of the greatest care that they were kept alive, in aquaria, for a period of six weeks.

Older larvæ (10 cm.–15 cm. in length), on the other hand, are remarkably hardy, and may be kept alive indefinitely in small aquaria of running water. It is not even necessary to have a constant changing of water. Sand should be placed in the aquaria, in which the larvæ may bury themselves.

The adult lampreys are moderately hardy and may be kept in small tanks of running water without difficulty. By catching a number of the adults, in the spring, as they are passing up the rivers to the spawning grounds, and keeping them in captivity until sexual maturity is reached, it seems probable that artificial fertilization may easily be accomplished and embryological material thus obtained.

ALBERT M. REESE.

JOHNS HOPKINS UNIVERSITY.

NOTES ON PHYSICS.

THE RATIONALISM OF ELECTRICAL UNITS.

PRESENT electrical units are irrational in that the factor 4π does not appear in certain equations where it would be proper for it to appear, while in other equations this factor does appear improperly. The British Association Committee on Electrical Standards fixed for us the present definitions of the units of magnetism and of electric charge when they published in one of their reports the little treatise on units by Maxwell and Jenkin. In this treatise the factor 4π is suppressed for the sake of simplicity and the result is that we have an 'eruption of 4π's' in other quarters. This eruption is due, literally, as Heaviside puts it, to the wisdom of our ancestors, who, according to the same witty sage, were sufficiently wise in their generation.

Several proposals have recently been made looking to the rationalization of our electrical units. The complete solution of the difficulty, according to the wisdom of the present generation, is proposed by Heaviside. This proposal involves great changes in the magnitudes of all electric and magnetic units—a very serious matter.

Professor Fessenden proposes an ingenious solution of the difficulty which involves no important change in any of the units which are used by engineers. Professor Fessenden's solution does not, however, completely rid us of the irrational appearance of the 4π factor, and if this solution were to be adopted by us, our posterity might still suffer by our wisdom.

On the whole this erruption of 4π's is not a very serious matter, and it is not likely that an international congress will soon take steps to rid us of it.

On the other hand there are some points of advantage in our present definitions of *magnet pole* and *electric charge*. It is all very well to talk of defining electric current, as the curl of magnetic force and of magnetic current as the curl of electric force, indeed it is very simple to think in this way when one has once abstracted his knowledge of electrical things sufficiently to make the images of these things meet—but how about the beginner?

Such things as force, temperature and electric current are measured by their effects. For example force may be measured by its distorting effects on elastic bodies or by its effect in changing the state of motion of a body. One of the most evident effects of a magnet pole is its attraction for other poles and the present writer knows of no simpler way to establish a quantitative basis for the discussion of magnetism than to agree at once to measure a magnetic pole in terms of its attraction for a unit pole, the unit pole being that pole which repels an equal pole at unit distance with unit force. Then the force of attraction of any two poles is $F = \frac{m'm''}{d^2}$. Now it leads eventually to simpler equations to so define the unit pole that $F = \frac{m'm''}{4\pi d^2}$ but the present writer, for one, would have some hesitation in presenting the matter to a class in this initially more complicated way with no other excuse than that a certain remote advantage will come of it. Perhaps the present writer, who finds his greatest trials in teaching, is unreasonably timid.

The most valid objection, however, to the present recasting of our systems of electrical units—for we are at present burdened with two systems, not including the entirely useless practical system—is that we have no assurance that a new system would stand. For, in the first place, a new electrical relation must be discovered before we can settle upon *one* system of units; and in the second place we do not know even whether electric current and curl of magnetic field are identical or merely proportional, as has been pointed out by J. J. Thomson.

W. S. F.

SCIENTIFIC NOTES AND NEWS.

On the occasion of the bi-centenary celebration of the Academy of Sciences at Berlin, Lord Kelvin and Professor Max Müller were elected foreign members. Professor Willard Gibbs, Professor H. A. Rowland, and Professor William James were among those elected Corresponding Members.

The marble statue of Huxley, which the Memorial Committee has given to the Natural History Museum at South Kensington, will be unveiled on April 28th. It is expected that Sir Joseph Hooker will make an address on Huxley, and that the statue will be received by the Prince of Wales on behalf of the trustees of the British Museum.

President Gilbert of the American Association for the Advancement of Science has authorized a meeting of the Council at the Assembly Hall of the Cosmos Club, Washington, D. C., at 4:30 p. m., on Thursday, April 19th.

Dr. Wm. Luther has been appointed director of the observatory at Düsseldorf, in succession to his father, Dr. Robert Luther, whose death we were recently compelled to record.

Professor S. W. Johnson has resigned the directorship of the Connecticut Agricultural Experiment Station after service of over twenty-two years, and is succeeded by Professor E. H. Jenkins, the vice-director.

Professor Silas W. Holman, emeritus professor of physics at the Massachusetts Institute of Technology, died on April 2d.

Professor St. George Mivart, the well-known writer on scientific subjects, died in London on April 1st, at the age of seventy-three years.

There died recently Major Fred. Mather, one of the most prominent of American fish-culturists. He was the author of many notable contributions to the Reports of the Fisheries of State and Government, long time an assistant of the U. S. Fish Commission, indeed

one of its originators. He was the inventor of several valuable forms of fish-hatching apparatus, especially for the treatment of adhesive eggs, and of the well-known 'refrigerating box' by which he solved successfully the problem of transporting fish-spawn across the ocean. He was several times employed on foreign missions connected with the fisheries. Under the N. Y. State Fish Commission he established the station at Cold Spring Harbor, and directed its operations for nearly fifteen years. He will also be remembered in themes of fish and fishing as a popular writer of rare talent. Born near Albany, N. Y., in 1833, he died at Cedar Island, on the Brule river, Wisconsin, on February 14th.

DR. EMANUEL LIAIS, the astronomer, has died at Cherbourg at the age of seventy-four years.

THE death is announced of Professor John Henry Pepper, an analytic chemist and public analyst in Brisbane, Queensland, at the age of 79 years.

PROFESSOR G. E. MORROW died, on March 27th, at the age of 60 years. He was for about 20 years professor of agriculture in the University of Illinois.

DR. ZUKAL, associate professor of botany in the Agricultural Institute at Vienna, died on the 15th of February, aged 55 years.

BY the generosity of Mr. William H. Crocker, of San Francisco, the Lick Observatory will be able, as we announced last week, to send a party to Georgia, to observe the total solar eclipse of May 28th. Only two observers, Messrs. W. W. Campbell and C. D. Perrine, will be sent out from the observatory; but several European astronomers have expressed a desire to join the party, and similar requests have also been received from astronomers connected with American colleges, which do not intend to send out expeditions of their own. The instrumental equipment of the expedition will be quite complete. The principal instrument for photographing the corona will be the 5-inch telescope of 40 feet focal length, used by the Lick Observatory parties in South America and India. For photographing the corona on a smaller scale there will be several cameras of from five to six inches aperture, and others of smaller size. One slit spectrograph, and two objective spectrographs arranged to give a continuous record of the changing spectrum at the beginning and end of totality, are also included in the equipment. Observations of contacts will be made. Any observers, having experience in astronomical or physical work, who wish to join the party at their own expense, like the gentlemen referred to above, are invited to communicate with the Director of the Lick Observatory before April 20th, and after that date with Professor W. W. Campbell, Lick Observatory Eclipse Expedition, Atlanta, Georgia.

SINCE September, the collections at the Gray herbarium of Harvard University have been increased to the extent of several thousand specimens from various parts of the world. Among the acquisitions is a collection of Central American plants, 875 in number, presented by Captain J. Donnell Smith, of Baltimore. Another, consisting of some 900 specimens, has come from Puerto Rico. The United States Department of Agriculture has sent 621 specimens of American grasses, the botanic garden of the University of Vienna, 877 Austrian plants, and the New York botanical garden, 561 plants from Idaho and Montana. In addition, 852 specimens from the Galapagos Islands have been received for the purpose of critical study. The staff is giving considerable attention to the continuation of the Synoptical Flora of North America, begun by Dr. Gray, and now being edited by Professor Benjamin L. Robinson. The usual amount of research work is in progress. Among those engaged in it are Professor Piper of the Washington Agricultural College and Professor Henderson of the Idaho Agricultural College, who are studying the type specimens of Western plants in the herbarium.

A CIVIL service examination will be held on April 17th to 18th to fill two vacancies in the position of cartographic draftsman in the Hydrographic Office, Navy Department.

A NEW York State Civil Service examination will be held on or about April 18th for the position of electrical engineer, with a salary of $900 and maintenance; and for the position of

physician in the State Hospitals and Institutions, with a salary of $600–$900 and maintenance.

We learn from the *Annals of the Deaf* that at the public session of the French Academy held November 24, 1890, Mr. Ferdinand Brunetière announced that the Montyon prize of $400 had been awarded for that year to Mrs. Marie Germaine, in religion Sister Sainte-Marguerite of the Daughters of Wisdom, for the successful education of two deaf-blind girls, Marthe Obrecht, who lost sight and hearing at the age of four, and Marie Heurtin, who was deaf-blind from birth. Both these girls had been taught to read, write, speak, and work.

The Council of the Royal College of Surgeons of England has appointed a Committee to adjudicate on the Walker Prize. This prize, which is open to investigators of all nationalities, is given for the best work in advancing the knowledge and therapeutics of cancer during the past five years ending December 31, 1900, and amounts to the sum of £100.

Mr. George Eastman, of Rochester, N. Y., has given $200,000 to the Mechanics Institute of that city. The money will be used to enlarge the present building.

The Baroness von Hirsch-Gerenth, who died recently, has bequeathed 50,000 francs for the establishment of a physiological and pathological laboratory on the Congo. Leopoldsville, the terminus of the Congo railway, has been chosen as the place where the laboratory is to be established.

It is proposed to introduce a bill into Congress appropriating $250,000 for the establishment at Paris, of an American Institute for the study of the fine arts. The plan has been presented to President McKinley by Ambassador Chambon and Senator Depew, and is said to have the approval of the Secretary of State. If the Government were to support institutes for applied science in foreign countries they would doubtless more than repay their cost.

The late Governor J. G. Smith has left $10,000 for a library at St. Albans, Vt.

The second malarial expedition, promoted by the Liverpool School of Tropical Medicine, left Liverpool on March 21st in the steamship *Olenda* for Old Calabar and South Nigeria. The object of the expedition is to study the cause, spread and the treatment of malaria and tropical diseases generally. The expedition consists of Dr. H. E. Annett Elliott (Toronto) and Dr. J. E. Dutton. Investigations and experiments will be made in accordance with the mosquito theory of Major Ross. In encouragement of the expedition the Colonial Secretary wrote expressing his appreciation of its objects, and said that he would do all in his power to secure the assistance of government officials in the West African settlements.

A cablegram has been received from Wellington, New Zealand, stating that the *Southern Cross* reached that city on April 1st. The Expedition, fitted out by Sir George Newnes and headed by Mr. C. E. Borchgrevink, sailed from London in August, 1898, and left Hobart, Tasmania, December 19, 1898. During the latter part of February the members landed from the *Southern Cross*, near Cape Adare, Victoria Land, on the Antarctic Continent. Mr. Borchgrevinck reports that he has found the position of the southern Magnetic Pole. Mr. N. Hansen, one of the zoologists of the expedition, died on the voyage.

The London *Times* gives some further details in regard to the Scottish-Antarctic expedition about to be organized to work in conjunction with the British and German Antarctic expeditions. It fills up a gap in the Antarctic regions, which neither the British expedition at present being organized by the Royal and Royal Geographical Societies of London nor the German national Antarctic expedition intends to explore. The Weddell sea quadrant, south of the Atlantic Ocean, will be the sphere of the Scottish expedition, while the British expedition will explore to the south of the Pacific Ocean and the Germans to the south of the Indian Ocean. This Weddell sea route, it may be mentioned, has been taken before by Weddell, Bellingshausen, and Ross in sailing ships, but has not yet been tried seriously with a steamer. The leader will be Mr. William S. Bruce, who visited the Antarctic regions in 1892 and 1893, and who has since made five

voyages to the Arctic regions. It is intended that the expedition should return in 1903, but if funds hold out, a year later.

THE annual Field Meeting or long distance excursion of the National Geographic Society has been arranged so that the members of the Society may have an opportunity to observe the total eclipse of the sun, which takes place on Monday, May 28th. As the center of the belt of totality will pass near Norfolk, Virginia, the board of managers of the Society have made a conditional contract with the Norfolk and Washington Steamboat Company for an excursion to that city and vicinity. The party will leave Washington by the Norfolk and Washington steamer at 7 o'clock, p. m., Sunday, May 27th. Returning, leave Norfolk at 6 o'clock Monday afternoon, reaching Washington on Tuesday morning in time for breakfast at home. The total duration of the eclipse will be 2 hours, 34 minutes and 6 seconds, of which 1 minute and 26 seconds will be total. The eclipse will be entirely over at 10:15.6 a. m., and from that hour until 6 o'clock the steamer will be at the disposal of the party for a cruise around the harbor and visits to the many points of interest around Norfolk, such as the Navy Yard, Portsmouth, Newport News, Fortress Monroe, the Indian Industrial School at Hampton, etc.

THE first volume of the scientific results of the Norwegian Polar Expedition, edited by Dr. Fridjof Nansen, is about to be issued by Messrs. Longmans, Green & Co. In addition to an account of the *Fram* by Mr. Collin Archer, the builder, the volume contains memoirs on the geology of Cape Flora in Franz Josef Land, by Dr. Pompeckj and Dr. Nansen; the fossil plants from Franz Josef Land, by Dr. A. G. Nathorst; the birds collected during the expedition, by Mr. Collett and Dr. Nansen; and the crustacea, by Professor G. O. Sars. It is expected that five or six volumes in all will be published.

THE Croonian Lecture before the Royal Society will be delivered on March 22d by Professor Paul Ehrlich. The subject of the lecture will be Immunity, with special reference to cell life.

THE Institution of Civil Engineers, London held its annual dinner on March 21st. Sir William Preece presided, and speeches were made by Lord Ashbourne, Lieutenant General Geary, Lord Welby and Lord Balfour of Burleigh. Sir William Preece stated that arrangements had been made to entertain American visitors at the Guildhall on July 5th.

The Annual Report of the Director of the Field Columbian Museum for the year 1898–99 shows a steady increase of the material in its various departments, most noticeable perhaps, in the way of fossil vertebrates, some fine specimens of the large Dinosaurs having been obtained in Wyoming. Good progress has been made in the Department of Anthropology, while the herbarium is now considered the best in the Central United States. While there has been a slight falling off in the total attendance, yet many more school children have visited the museum than ever before, and the courses of lectures have been deservedly popular. The report is illustrated by a number of plates showing some of Mr. Akeley's fine mammal groups and some of the anthropological exhibits, as well as a view of a remarkably fine skull of *Titanotherium*, considered as *T. ingens*.

The following letter has been addressed to Sir Michael Foster on the occasion of his entering Parliament by a number of his former pupils at Cambridge.

We, a few of your Cambridge friends, take the opportunity given by your entering Parliament to express our loyalty, respect, and cordial friendship towards you. Though we regret anything which takes you from among us, yet we cannot but rejoice that the cause of learning has gained so strong an advocate in Parliament. The work you have done in Cambridge during the last 30 years seems to us of unique value. You have taught us to recognize what is worth learning, and you have taught us how to learn. If we in Cambridge now value and seek after the advancement of natural knowledge, we owe it to you more than to any man living. We beg you to believe that we are grateful, and we shall rejoice if we can in any way prove our sincerity. We can ill afford to lose either the weight of your name or your guidance at our councils; we can, indeed, hardly imagine a greater misfortune than the breaking of the bond between you and us. But we cannnot complain if, after many years of service, you have found it necessary to loosen

your official ties to the University. We regret that your enlarged liberty has not come to you in a form which would have marked our sense of what we owe to you. But we rejoice that an arrangement has been arrived at which will allow your interests still to centre in Cambridge, giving you, at the same time, the opportunity of working in a wider field, where you may do for England what you have already done for Cambridge, and where your services to learning may benefit, not only England, but the whole English-speaking race.—We are proud to sign ourselves your friends and pupils—FRANCIS DARWIN, A. G. DEW-SMITH, WALTER GARDINER, W. H. GASKELL, ALFRED C. HADDEN, W. B. HARDY, S. F. HARMER, WALTER HEAPE, J. N. LANGLEY, J. J. LISTER, A. SEDGWICK, A. C. SEWARD, ARTHUR E. SHIPLEY, L. E. SHORE, H. MARSHALL WARD, H. K. ANDERSON, A. S. LEA. March 9, 1900."

THE *British Medical Journal* states that a Medical Congress of the Island of Cuba is now being organized. It is to be held at Havana, and will open on February 24, 1901. The president of the organizing committee is Dr. Vicente B. Valdés. The subjects with which the Congress will deal in are the following: (1) Local Anthropology; (2) Medical Topography and Statistics; (3) Yellow Fever; (4) Paludism; (5) *Biebre de borras;* (6) Chronic Enteritis of Hot Countries; (7) Febrile Conditions of Infancy which do not correspond to Definite Clinical Types; (8) Treatment of Pulmonary Phthisis by Local Climatotheraphy; (9) Medical Hydrology of Cuba; (10) Therapeutic Uses of some Indigenous Plants.

THE New York *Evening Post* states that the scientific museum of Princeton University has received a collection of Indian pottery, stone axes, and articles used in religious ceremonies of the Hopi Indians of Arizona. This gift is the first installment of a series from Stanley R. McCormick, '95. The present collection consists very largely of pieces of recent manufacture, which represent the methods of modelling and decoration employed by this tribe of Indians. This McCormick collection will have special value as supplementing the large collections already possessed of Mexican and Peruvian pottery and the extensive Sheldon Jackson ethnological collection from Alaska and New Mexico.

AN exhibit from the United States Patent Office has been sent to the Paris Exposition. It is confined to models representing the applications of electricity to which American inventers have contributed so much. There is a law forbidding the taking of models of patents from the country, but a special Act of Congress was enacted permitting it in this case. This was accomplished, however, so late as to interfere somewhat with the completeness of the exhibit.

UNIVERSITY AND EDUCATIONAL NEWS.

DR. HENRY S. PRITCHETT, Superintendent of the U. S. Coast and Geodetic Survey, has been elected president of the Massachusetts Institute of Technology.

THE Maryland Legislature has voted against the continuation of an annual appropriation to the Johns Hopkins University.

SIR WILLIAM C. MACDONALD has made a further gift of $200,000 to McGill University for the work in mining and chemistry.

MERTON COLLEGE, Oxford, has offered to contribute, out of its University Purposes Fund, £700 towards the cost of fitting up, and £500 towards that of maintaining for two years, a new electrical laboratory.

THE New York *Evening Post* states that the sophomore class, of Yale University, which by the catalogue of this year contains 305 students, has made choice of studies under the new elective system as follows: Greek has been chosen by 124, Latin by 203, chemistry by 48, physics by 202, English by 259, French by 117, German by 178, history by 202, and mathematics by 159. It will be remembered that last year the members of the sophomore class were required to elect five of six subjects. This year additional electives in chemistry, history, modern languages, and mathematics have been provided.

A CHAIR of intertropical pathology has been established in the University of Havana for Dr. J. Guiteras, formerly professor of pathology in the University of Pennsylvania.

PROFESSOR JACQUES LOEB, of the University of Chicago, has been appointed professor of physiology in the Rush Medical College, recently affiliated with the University. It is understood that the junior work in physiology will be carried out at the University of Chicago.